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BARRICK
MERCUR

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December 30, 1997

Mr. Don A. Ostler, PE, Director
Division of Water Quality
Utah Department of Environmental Quality
288 North 1460 West
P.O. Box 144870
Salt Lake City, UT 84116

Dear Mr. Ostler:

Re: UGW450002

Attached please find the final proposed closure plan and request for construction permit for the Reservation Canyon tailing impoundment located at the Mercur Mine. The document entitled ***Barrick Resources (USA) Inc. Mercur Mine Final Tailing Impoundment Closure Plan, December 31,1997*** was prepared principally by JBR Environmental Consultants with the assistance of Mercur engineering.

As you are aware, active gold ore mining and beneficiation ceased in March 1997. Remining and reprocessing of the historic tailing was initiated in April 1997 and will continue through March 1998. The closure plan submitted herewith identifies the processes, practices, and procedures to be utilized by Barrick to complete the reclamation, revegetation, and post-closure monitoring of the Reservation Canyon tailing impoundment. Please note that while the schedules for completion of this final closure are not exact, Barrick is proposing to complete all practicable activities in 1998.

Also please note that the plan submitted herewith compliments the December 30, 1997, final proposed *Mining & Reclamation Plan* submitted to the Utah Division of Oil, Gas, and Mining and the *Post Closure Management of Reservation Canyon Tailing Impoundment Incidental Flows, Barrick Resources (USA) Inc. - Mercur Mine*. Copies of these documents have also been provided to the Division of Water Quality. Barrick anticipates that with the submittal of these documents, final approval for the closure of the Reservation Canyon tailing impoundment can be achieved by May 1, 1998.

To facilitate this goal, Barrick requests a meeting with the Division staff responsible for review and approval of this plan by the end of January 1998. Initiation of discussions at this early date will allow final details to be determined and approvals received prior to May 1, 1997, the target date for initiation of final reclamation. Barrick is committed to provide all necessary staff and resources to assist the Division in the plan approval process.

Please contact Dave Beatty at 801-268-4447x335, or me to arrange for the above noted meeting.

Respectfully;

G Eurick

Glenn M. Eurick
Director Environmental Relations US

C: w / attachments
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BARRICK RESOURCES (USA), INC.
MERCUR MINE FINAL
TAILING IMPOUNDMENT CLOSURE PLAN

December 31, 1997

Prepared for:

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Tooele, Utah 84074

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BARRICK MERCUR MINE FINAL
TAILING IMPOUNDMENT CLOSURE PLAN

Executive Summary

Upon cessation of ore processing, the Reservation Canyon Tailing Impoundment will contain approximately 25 million tons (Mt) or 22 million cubic yards (Mcy) of tailing. The tailing surface will cover approximately 98 acres. It is the intent of Barrick Resources (USA), Inc., to close this facility in an orderly and deliberate manner which will also ensure compliance with the statutes, regulations, and permits which pertain to the construction, operation, and closure of the facility. Closure in this use includes final reclamation and revegetation of the impoundment.

This closure plan reviews the pertinent regulatory objectives of the agencies which jointly govern the facility. These agencies are:

Utah Division of Water Quality
Utah Division of Water Rights
Utah Division of Oil, Gas and Mining
Utah Division of Air Quality

The past, present, and future configurations of the facility are reviewed, including the physical and chemical characteristics of the tails. The salient characteristics of the site geology, hydrology, soils, and vegetation are presented in support for the design objectives of the plan.

Both surface and ground water quality are protected by existing and proposed designs. The structural stability of the impoundment and its embankments are and will be assured for agents ranging from erosion to significant seismic events. Fugitive dust is and will continue to be controlled through the final closure. The area is designed to ultimately return to grazing and wildlife use. These design objectives comply with the applicable public health and safety regulations.

The final closure is proposed to include evaporative dewatering of the tailing impoundment followed by a period of time during which surficial consolidation of the tailing solids will occur. An earth cover will then be placed over the entire tailing surface. The purpose of this cover will be to isolate the tailing from the surface environment and to reduce infiltration. The surface of the cover will be revegetated with a final reclamation seed mix.

The construction of a flood discharge spillway and engineered breach will be part of the closure plan. These ensure protection of the dam and buttress faces as well as the contained tailing. The spillway will also minimize storm water ponding in the basin, and rewetting of the enclosed tailing.

Following closure, monitoring will continue in accordance with applicable permit requirements.

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BARRICK MERCUR MINE FINAL TAILING IMPOUNDMENT CLOSURE PLAN

1.0 Background

The Mercur tailing impoundment was originally permitted in 1981. The former owner of the facility, Getty Mining Company, obtained the following permits for tailing impoundment: a Permit to Construct from the (then) Utah Bureau of Water Pollution Control, approval of a Notice of Intent and Reclamation Plan from the Division of Oil Gas and Mining (Permit No. ACT/045/017), approval of a Plan of Operations from the U.S. Bureau of Land Management (Permit No. U27-86-08P), a National Pollutant Discharge Elimination System permit from the Environmental Protection Agency, a Construction Permit from the Utah Division of Water Rights, Dam Safety Section, and other necessary State and Local permits. All permits previously acquired by Getty were transferred in their entirety to Barrick Resources (USA), Inc (Barrick).

In compliance with the terms of Ground Water Discharge Permit No. UGW 450002, on September 27, 1994, Barrick submitted a conceptual plan for closure of its Mercur Mine tailing facility for review and comment by the U.S. Bureau of Land Management (BLM) and the Utah Divisions of Water Quality, Water Rights (Dam Safety), Oil, Gas & Mining, and Air Quality.

Comments were received from these agencies during 1994 and 1995. Since that time, Barrick has completed a land exchange with the BLM and they no longer have jurisdiction regarding final closure of the Mercur mine, including the tailing facility. The comments of the other agencies have been considered in the development of this final version of the tailing facility closure plan.

Since the submission of the preliminary closure plan, Barrick has completed detailed studies of the following aspects of the tailing impoundment closure planning:

1) Final tailing surface dewatering,
2) Consolidation and settlement of the tailing solids,
3) Storm water runoff,
4) Surface water diversions,
5) Spillway design,
6) Cover designs,
7) Cover infiltration estimates,
8) Long-term drainage estimates,
9) Disposal of drainage flows,
10) Long-term stability,
11) Construction scheduling and cost estimates.

These studies have been used by Barrick to plan the final closure of Mercur. The conclusions of these studies have been used in the development of this final closure plan for the Reservation Canyon tailing facility. Many of these reports are referenced in this document. Copies of these reports are available for review at the Barrick offices.

1.1 Location

The Mercur mine and mill are located in Mercur Canyon in the Oquirrh Mountains, 35 miles southwest of Salt Lake City, Utah (Figure 1). The tailing impoundment is located in Section 5, Township 6 South, Range 3 West, Salt Lake Base and Meridian (Figure 2).

1.2 Regulatory Agencies and Objectives

The regulatory objectives set forth in the permits issued by the relevant agencies are described in this section. The final closure plan for the Mercur tailing impoundment meets the applicable regulations and/or conditions of permits issued to Barrick by the following regulatory agencies: the Utah Division of Water Quality (DWQ), the Utah Division of Oil, Gas and Mining (DOGM), the Utah Division of Water Rights-Dam Safety Section and, the Utah Division of Air Quality (DAQ). Barrick also sought the input from other relevant agencies as necessary to develop the final version of this closure plan. This was accomplished by holding a series of meetings with State, Federal and local agency representatives during 1996.

2.0 Closure Plan Design Objectives

The closure plan for the Reservation Canyon tailing impoundment is based on design objectives for the type of closure which is most appropriate for the facility. These objectives are based on applicable regulatory obligations as well as the physical characteristics of the facility.

2.1 Health and Safety

The current tailing facility complies with applicable State and local regulations regarding public health including protection of air, surface water and ground water quality. The facility contains all impounded tailing with no surface discharge and is fully lined to protect ground water quality (Figure 3). The facility is also surrounded by a fence to exclude persons and big game. In the initial post-closure time period (three years following final revegetation of the facility) this fence will be maintained to enhance the potential for successful reclamation of the facility. After the release of the reclamation bond for the facility by the DOGM, this fence may not be maintained and persons may be able to gain access to the reclaimed tailing basin.

For long-term protection of human health and to provide for compliance with applicable surface water and ground water discharge limitations, the tailing solids will be covered with earth designed to isolate them from the surface environment.

The final elevation of the tailing dam butress will be 7360' with a 2h:1v downstream slope (Figure 4). The surface topography of the tailing impoundment will be that of a broad basin sloping at about 1 to 2 percent from the west, east, and south margins of the impoundment toward the northwest corner where the spillway will be located. The spillway entrance elevation will be set to an elevation equal to the elevation of the top surface of the final cover so the impoundment will be free draining for surface runoff and there will be minimal storage capacity within the impoundment. This inlet elevation will be controlled with gabions which can be adjusted in the future as necessary to account for settlement of the tailing solids under the earth cover. In addition, the reclaimed abutments will extend a minimum of 3 feet above the level of the final earth cover at the west and south margins of the impoundment to permanently contain the tailing.

2.2 Protection of Ground Water Quality

Utah ground water protection regulations, and the Barrick ground water quality discharge permit require that the ground water quality protection levels specified in the permit for monitoring wells TMW-1, TMW-2, MW-15, MW-16, MW-17, and MW-18 are maintained. It is anticipated that there will be a slow release of pore water from the settled tailing solids through the bottom of the impoundment area. This would consist of tailing water that was originally discharged with the tailing and is trapped in the solids as connate water and also any precipitation water that infiltrates into the tailing solids from the surface. Calculations of this drainage have indicated that it will be minimal within 10 to 11 years after the pond is covered, after which seepage will attain a steady-state flow approximately equal to the infiltration through the cover (TriTechnics, 1996). After covering and reclamation of the tailing surface is completed, it is estimated that the upper 90 feet of the tailing would drain to field capacity within approximately 7 years.

Runoff from the upland watersheds above the tailings impoundment will be permanently diverted around the impoundment in diversion ditches constructed at the perimeter of the facility (Figure 5). These diversions were designed to conservatively carry the runoff from the 100-year, 24-hour precipitation event (JBR, 1996a). The diversions will be protected from erosion at the flow velocities resulting from the design precipitation event. The water in the channels will be diverted out of the Reservation Canyon watershed to the north and south of the tailing impoundment (see Figure 6). These actions will minimize the precipitation gain on the impoundment area to only the amount that falls directly on the final cover surface.

Analyses of the performance of various cover designs have been completed by a number of consultants. Based on these evaluations, Barrick is planning to place a 3-foot thick earth cover over all areas of tailing deposition which will consist (from top to bottom) of 1-foot of topsoil, 1-foot of subsoil, and 1-foot of broken rock fill. This cover will reduce infiltration into the underlying tailing to approximately 1 to 8% of the annual precipitation amount primarily by causing the precipitation to run off the reclaimed surface, and through the evapotranspiration of the perennial plants growing in the topsoil member of the cover. The broken rock layer at the base of the cover will limit upward migration of moisture and dissolved solids from the underlying tailing by capillary forces.

2.3 Protection of Surface Water Quality

The tailing impoundment and the tailing dam chimney drain catchment ponds are currently considered no-discharge points under the Barrick UPDES permit UT0023884. In order to comply with the ore mining and dressing effluent limitations of 40 CFR 440.100, there can be no discharge of process water from these facilities to surface waters while these facilities are active. Once the tailing facility is undergoing reclamation, it is no longer an "active mining area" under these regulations, and the point-source effluent limitations would no longer be applicable. However, the EPA and DWQ storm water discharge regulations would still apply to any runoff from the tailing facility after operations are terminated. The storm water rules include a provision that excludes from regulation those mining operations that are fully reclaimed and released from surety bonding obligations [UAC R317-8-3.8(6)(d)(3)]. Thus these regulations would not apply to the tailing facility once it is reclaimed and the bond is released by the DOGM.

The natural drainage channels of Mercur Canyon are ephemeral and currently have no surface water protection standards under State regulations. The ephemeral flow from Mercur Canyon runs into Rush Valley. There are no reservoirs or other developed points of diversions in Mercur Canyon downstream of the tailing facility. The most likely beneficial use for the water downstream of the facilities is for wildlife or livestock that may be grazing near the natural drainage channels when they are flowing.

Barrick completed the Golden Gate pit in the bottom of Mercur Canyon downstream from the tailing facility (Figure 2). This open pit will not be fully backfilled and will remain as a permanent feature of the landscape. It will intercept all runoff from watersheds upgradient from the pit and will be a permanent infiltration basin known as the Golden Gate Basin (Global Environmental Technologies, 1997). Barrick has studied the potential for degradation of surface or ground water quality from the operation of the basin. It has determined that the oxidized and carbonate-rich rock exposed in the walls and bottom of the basin will not deleteriously affect the quality of runoff water collecting in the basin. There are no perched water tables exposed in the basin walls and the water table in the area is known to be approximately 2,000 feet deep so there will be no contribution of ground water seepage to the basin. The fractured nature of the rock in the basin will readily allow infiltration of any collected water so the accumulations of water in the basin should be ephemeral. The runoff channels leading to the basin will be engineered to minimize erosion of the channels where they empty into the basin.

Precipitation runoff from uphill watersheds will be routed around the reclaimed tailing impoundment in constructed channels that are engineered to safely pass the 100-year, 24-hour flow (JBR, 1996a). There will be controlled discharge from the reclaimed tailing impoundment through a designed spillway system that will be added to the facility as part of the final closure and reclamation actions. Precipitation falling directly on top of the reclaimed tailing impoundment will readily drain through the spillway without impounding in the facility. The discharge from this spillway will be routed to Meadow Canyon upstream from the Valley Leach No.3. This may add to the runoff flow in Meadow Canyon that will pass on the east side of the leach pad. Because there has been a diversion channel around the tailing facility for its entire operating history, and no runoff has been observed exiting this channel, it is likely that flow in the final diversion channel around the tailing will only occur during large runoff events.

The downstream surfaces of the original main dam and the saddle dam have already been reseeded. These areas will be fully reclaimed by the time the mill operations are terminated. Runoff and seepage from the buttress and levee will be collected in seepage collection systems at the toes of these structures. This will be pumped back to the east bay of the tailing impoundment as long as the seepage collection pump system is active. When the east bay pond is reclaimed, the seepage collection and pump back system will no longer be operated for handling seepage. At this time, incidental flows will be collected in subsurface piping systems and infiltrated into the ground in engineered infiltration galleries located near the base of the main dam and into Valley Fill Leach 2.

2.4 Fugitive Dust Control

The release of fugitive dust from mining facilities in Utah is regulated by the Division of Air Quality (DAQ). Fugitive dust is required to be controlled at the source.

The final closure treatment of the Mercur tailing impoundment surface will provide interim dust control on the dry tailing surface until the final cover can be constructed. This will be accomplished by wetting the tailing surface with a forced evaporation system including pumps and piping to distribute the remaining pooled water over the sub-aerial portion of the tailing (JBR, 1995a). The final tailing cover will be constructed in annual phases beginning in 1998 (DG Consultants, 1996). This cover will itself include a revegetated topsoil surface which will minimize fugitive dust emissions from the reclaimed tailing facility.

2.5 Structural Stability

According to current plans, the Reservation Canyon tailing facility will be a permanent topographic feature containing over 20 million cubic yards of tailing at a final tailing elevation of approximately 7355 feet. The tailing surface will then be approximately 329 feet above the original ground surface under the centerline of the original main dam and approximately 169 feet above the ground level under the centerline of the levee structure. It is necessary that this topographic feature be structurally stable in the long term. There are three main objectives of structural stability for the reclaimed tailing facility including:

1) Long-term slope stability of the impounding structures,
2) Resist overtopping from any future water accumulation in the impoundment area, and
3) Final cover must be able to accommodate future settlement of the tailing solids.

2.5.1 Mass Stability of Embankments

The mass stability of the final tailing dam has been analyzed for both drainage and slope stability (Physical Resource Engineering and Water Management Consultants, 1996).

Slope stability of the embankments was modeled with the computer program PCSTABL5M.. The stability analyses indicate that the static safety factor of the main dam and reclaim levee were 1.9 and 2.5 respectively. At 0.1g seismic loading, the safety factors reduced to 1.5 and 1.9 respectively. Safety factors of 1.0 were calculated for seismic loadings of 0.3 and 0.45 for the main dam and the reclaim levee respectively. These safety factors indicate that the embankments have relatively high safety factors which are predicted to improve over time as the tailing and the embankments drain, pore pressures decrease, and tailing solids consolidate.

The potential for liquefaction of the tailing solids has been checked. It was concluded that the average grain size of the tailing and friction cone test strength data indicate that the Mercur tailing are not very vulnerable to liquefaction (Physical Resource Engineering, 1990).

Drainage of the tailing solids was modeled using the computer code HELP V3.05 (Tritechnics, 1996). Results of the computer modeling indicate that the top 90 feet of tailing would free drain to field capacity in about 7 years. The entire tailing deposit is anticipated to be free drained in about 11 years after which the drainage from the tailing will equal infiltration through the tailing cover.

The operational records of the tailing facility indicate that seepage from the main dam buttress and the reclaim levee are at a maximum when there is tailing water at or near the upstream face of these embankments. At these times, seepage flow rates can be in the order of about 15-35 gpm. When this is not the case, drainage from the embankments is from 10 - 15 gpm. Drainage from the internal drains of the main dam and the saddle dam are typically less than 1 gpm. It is anticipated that the amount of seepage from the embankments will quickly decrease from normal operational levels to less than 5 - 10 gpm within the first few years after cessation of water deposition in the impoundment. The actual seepage rates from the embankments will be monitored during the closure period to determine the actual curve of decreasing flows. This will allow prediction of future seepage flow rates for checking the design of the long-term seepage management system.

During the time that the east bay water storage pond is operational, seepage collected at the embankments will be returned to the east bay pond. After the east bay pond is reclaimed, continued seepage will be collected from the current sumps and conveyed in buried piping to infiltration galleries located downhill from the embankments.

Barrick believes that long-term disposal of seepage from the tailing embankments in subsurface seepage galleries is the best approach. Surface and subsurface land application of similar solutions from heap leach pads has been successfully practiced in other states with gold mine facilities. The chemistry of the solutions proposed to be disposed in this manner are essentially the same as those that have comprised the *de minimis* seepage from the tailing facility liner over its entire operational life. The quantity of seepage from the proposed seepage galleries is less than the previous estimate of seepage losses through the clay liner (Dames and Moore, 1991). The net amount of total annual seepage through the liner and the proposed seepage galleries after closure of the tailing facility will be less than the annual amount of seepage from the liner during operations. The lack of impacts to date in ground water quality in the monitoring wells downgradient of the tailing pond are an indication that the proposed seepage galleries should not result in any degradation of ground water quality.

The tailing embankments are anticipated to remain in a safe, unsaturated condition during operations and this condition will only improve after operations cease and tailing water is not being discharged to the impoundment. Drainage of the tailing water from the embankments is expected to decrease over time to a long-term rate of less than 10 gpm which will be collected and routed in buried piping to subsurface infiltration systems constructed near the toe of the main dam and in Valley Leach No. 2. Settlement of the tailing surface will occur gradually over time and will be a maximum along the thickest portion of the tailings deposit just east of the main dam. This settlement will be accommodated in the design of the spillway and the final grading of the tailing.

2.5.2 Flooding of Impoundment

The 100-year, 24-hour precipitation event has been used as the design storm for planning the surface drainage of the reclaimed tailings facility. The selection of this storm event has been determined to be acceptable to the Division of Water Rights (Dam Safety Section) and the Division of Oil, Gas & Mining who have jurisdiction over the structural stability of the reclaimed features (JBR, 1996a, 1996b).

The present diversion ditch above the tailing impoundment will divert most of the upland runoff to Meadow Canyon as long as it remains open. However, future geomorphic processes such as soil creep and slope failures may destroy the diversion ditch. Therefore, it has been assumed to be non-functional for the hydrologic design of the tailing facility closure.

A new, permanent drainage ditch will be constructed at the margin of the tailing impoundment. This will route upland runoff to the north and south of the tailing facility and prevent upland runoff from entering the reclaimed impoundment area. The ditch has been designed to be 15 feet wide on the bottom with 2h:1v side slopes and will be constructed to be non-erosive at the design flow (JBR, 1996a).

The average annual precipitation contribution to the impoundment, is estimated to be approximately 17-18 inches. The annual evaporation rate for the facility location is estimated to be about 30 inches per year. Thus, there should be no permanent accumulation of surface water in the tailing impoundment due to the average annual precipitation.

The tailing have been discharged to the impoundment along the margin of the impoundment area which will result in a slope on the tailing solids from the all sides toward the northwest corner of the impoundment. This slope is approximately 1 to 2 percent which will result in a maximum tailing solids elevation of about 7347 feet against the buttress and 7335 feet at the north margin of the impoundment. Therefore, all surface drainage on the top of the tailing will be toward the future spillway.

In compliance with State Engineer regulations, the facility will be fitted with engineered surface drainage structures to prevent any significant impounding conditions within the reclaimed tailing basin (JBR, 1996a). A 12-foot wide spillway will be excavated into the topographic low point at the northwest corner of the impoundment (Figure 6). This will be excavated 10 feet below the initial tailing surface elevation at the spillway entrance (7335') to accommodate future settlement of the tailing. The excavated spillway will slope toward the north at its outlet to Meadow Canyon. The bottom and side slopes of the channel will be riprapped for long-term stability. The entrance of the spillway will be fitted with a 10-foot high gabion retaining wall to hold back the tailing solids. The top elevation of this retaining wall will be reduced as necessary in the future by removing gabions to match the elevation of the top of the wall with the settled elevation of the tailing cover. This will enable surface runoff from the reclaimed tailing impoundment to drain out the spillway. In addition, an engineered breach will be constructed over the top of the reclaim levee. This riprapped channel will function as a stable emergency overflow from the tailing impoundment if the spillway would ever become plugged.

2.5.3 Settlement of Tailing Surface

The tailing solids were deposited under both subaerial and subaqueous conditions. The sand fraction of the tailing was deposited on a typically subaerial beach whereas the silt and clay fractions were typically deposited in a subaqueous environment. The in-place, dry unit weight of the sands on the beach is about 94 pounds per cubic foot (PCF). The surficial silts and clays have dry unit weights of about 85 PCF. The tailing solids are anticipated to consolidate as they drain.

Tailing consolidation will be achieved through drainage of pore water achieving a closer grain packing while the sediments remain saturated. This is a gradual process that is controlled by the rate contained water can be drained from the tailing and the overburden loads. This consolidation will be faster with the sandy tailing deposits than in the less permeable silts located further out into the tailing impoundment. The slowest sediments to drain will be the clayey tailing because they are the furthest from the drainage systems and have the lowest permeability. The total amount of consolidation is typically less for sandy materials than silty materials because the initial void space in the silty materials is greater. The total amount of consolidation in clays is greatest because they have the largest percentage of initial void space.

One potential result of consolidation of the Mercur tailing is the settlement of the buttress which is supported by the tailing. The total probable settlement of the maximum height buttress was predicted to range from about 1 to 3 percent (Physical Resource Engineering, 1990). However, to date the actual settlement values have been much less than predicted. Settlement of the buttress is monitored during operations, and is not considered to be a significant concern in designing the closure plan.

General experience that Barrick has obtained from review of other tailing impoundment reclamation projects under similar conditions indicate that the settlement of the drained tailing at Mercur should be minimal, on the order of a few feet. Most of this settlement is anticipated to occur within the first few years after the tailing impoundment is dewatered and the upper portion of the tailing is drained and covered. During this time, survey measurements will be obtained within the impoundment area to monitor the settlement and produce a predicted settlement profile.

2.6 Post-Mining Land Use

The intended post-mining land use for the Mercur Mine property following reclamation of the tailing facility would be livestock and wildlife grazing.

3.0 Proposed Closure Plan

The components of the closure plan have been selected to meet the design objectives for the tailing facility closure. The closure plan is designed to protect human health and safety, provide for the long-term stability of the facility, minimize future impacts to the environment, and comply with regulatory requirements.

3.1 Dewatering

Following cessation of mill operations, the remaining pool of tailing water will be allowed to completely evaporate. Water from the main portion of the tailing impoundment will be pumped to a 60 million gallon, lined water storage pond that has been constructed in the east bay portion of the impoundment. This storage pond will be used to reduce the subaqueous area in the main pond which will expose more tailing solid. Water from the decant water pool in the bottom (northwest) portion of the main impoundment and from the east bay water storage pond will be pumped during the evaporation season through pipes to sprays located along the subaerial periphery of the tailing solids. Experience with using snow guns at the tailing impoundment have shown the feasibility of evaporating large quantities of water during the evaporation season. Using about 20 of these spray guns, the water will be spread in a sheet flow over the exposed tailing surface to evaporate. This method of dewatering uses about 20 acres of subaerial tailing and a pumping rate of approximately 2,400 gpm to evaporate 50-60 million gallons during the 8-month evaporation season (DG Consultants, 1996).

In addition to the 70-80 million gallons of water anticipated to be present in the tailings impoundment when the mill ceases operations in early 1998, drain-down and precipitation water from Valley Fill No.3 will also be pumped to the tailing facility for evaporation. Accounting for winter freeze, snowmelt, and precipitation gain, it is anticipated that the net evaporative loss from the tailing facility can be effectively managed to eliminate all the surface water in the impoundment by the end of 2001.

As the remaining water is evaporated, the tailing solids will begin to dry top down. This desiccation will reduce the water content of the tailing solids and tend to enhance their consolidation, particularly in the clayey solids. As these solids desiccate, their dry unit weights are expected to increase as will their strength. As the clayey materials desiccate, their bulk permeabilities are expected to decrease although desiccation cracks having high permeabilities may also for. The sandy materials are not expected to consolidate or crack as they desiccate. The strengths and permeabilities of the sandy materials are also not expected to change with time.

The load bearing strength of the tailing will vary with the type of material. The sandy beach materials along the periphery of the impoundment will have the highest bearing strengths. Experience has shown they are expected to be able to support light-weight, low-ground-pressure, tracked mechanical equipment almost immediately after water is removed from their surface. These are the areas that will be covered and reclaimed within the first years following cessation of mill operations (1998 and 1999). The silts, clayey silts and the clays are expected to have poorer bearing strengths and are not expected to be able to directly support any mechanical equipment until they have been allowed to dry for a period of time following removal of all water from their surface. These areas will be covered and reclaimed during the second and third year following cessation of milling operations (2000 and 2001). The design of the final cover is such that it should be able to be constructed on all areas of the tailing after only minimal surface drying. Construction of the final cover will proceed on roughly concentric bands of subaerial tailing as the phreatic surface decreases and the area required for water storage is reduced. Each year the area of exposed tailing will become smaller and the area of completed cover will increase. If the evaporation process is found to go faster than predicted, the construction of the cover will be accelerated and may not take as long as discussed above.

3.2 Removal of Equipment

Following the dewatering operations, the pumps, piping and other equipment that were no longer necessary will be rinsed to remove any remaining processing solutions and be removed from the tailing facility.

3.3 Surface Drainage

During the period when the tailing surface is being dewatered and covered, the tailing impoundment will remain as a no-discharge facility with all water being contained within the impoundment. The tailing impoundment will then be fitted with a spillway and an overflow breach in compliance with Dam Safety Section requirements. Completion of this outlet system will be scheduled following elimination of the tailing decant pool by evaporation or transfer to the east bay.

In order to provide for complete drainage of the tailing basin, a spillway will be cut across the pass between Reservation and Meadow Canyons located to the north of the tailing pond (Figure 6). This will be a trapezoidal channel with a bottom width of at least 12 feet, depth of approximately 8 feet, side slopes of 2h:1v and a channel slope of about 1% (JBR, 1996a). The slopes of the spillway excavation above the spillway channel itself will be sloped as necessary to provide for long-term slope stability. The spillway will have a nominal inlet elevation of 7335 feet over the top of the gabion retaining wall and 7325 at the base of the gabions, a discharge elevation of 7320 feet, and will be approximately 600 feet long. This channel will have the capacity to pass the design peak flow at a velocity of less than 7.5 fps. The inlet elevation of the spillway will allow for complete surface drainage of the impoundment. Thus, with the exception of temporary routing of stormwater during major storms, the reclaimed tailing basin should not contain any ponded runoff water. The outlet of the spillway channel will be onto the slope of Meadow Canyon where the exposed or near-surface bedrock will prevent damage to the spillway during the 100-year, 24-hour flow event. Rip rap will also be placed at the inlet to the spillway as required to prevent erosion of the tailing cover.

The spillway will not be opened for flow from the reclaimed surface of the tailing impoundment until all areas of tailing have been covered. Therefore, the final elevation of the spillway will be determined after the tailing impoundment has been largely dewatered and covered. This will allow for some of the settlement of the tailing to occur and the potential settlement profile of the impoundment will be determined. The final spillway inlet elevation will then be decided to incorporate anticipated settlement of the reclaimed impoundment surface into the design. This will help provide for maximum drainage of surface water from the reclaimed impoundment area through the spillway. Any low spots that occur in the impoundment area through differential settlement of the tailing should be relatively shallow and any runoff that impounds in these low spots should be minimal in depth and volume and ephemeral in nature.

In addition to the spillway outlet described above, another engineered breach will be installed in the reclaim levee (Figure 6). The purpose of this breach would be to provide another means of discharge from the covered tailing impoundment area in the unlikely event that the main spillway would become plugged. The breach will be a low area excavated through the crest of the reclaim levee buttress on the south side of the tailing impoundment down to an elevation that is a minimum of 1 foot below the crest of the main dam buttress. Water moving through the breach and over the rock buttress fill will flow into the permanent south diversion channel for the tailing impoundment. Flow through the breach would then be safely conveyed into the rest of the permanent Mercur surface drainage system.

Two trapezoidal diversion channels will be built along the periphery of the tailing impoundment to collect and divert any upland runoff to the north and south of the impoundment (Figure 6). These have been designed to carry the peak flow from the 100-year, 24-hour runoff event (JBR, 1996a). The channels will have a bottom 15-foot width so they can also be used as an access road. Their depth will vary from about 2.5 feet to about 6 feet, including freeboard. The channels will be protected from erosion with grass vegetation and/or crushed rock or rip rap. The north channel will discharge into the proposed spillway channel and thereby be routed to Meadow Canyon, past the east side of Valley Fill Area No.3 and into the Golden Gate Basin. The design of the permanent diversion channel along the east side of Valley Fill Area No. 3 included the flow from the tailing impoundment spillway (including the north channel flow) and the upland watershed runoff from Meadow Canyon (JBR, 1996b). The south channel will be routed to the north side of Valley Fill Area No.2 and then join other drainage channels that will be constructed west of the tailing facility (JBR, 1996b). The water draining from the south channel will eventually be discharged into the Golden Gate Basin.

3.4 Regrading

The outer slopes of the main dam and saddle dam were revegetated in the past and will not be regraded during final closure activities. The downstream faces of the main dam buttress and the reclaim levee have slopes of 2h:1v and these will also not be regraded during closure. The tops of the buttress and levee will be rounded on the edges with the excess material dozed onto the tailing to form a 3h:1v slope from the top of these features to the tailing solids. The tops of the regraded buttress and levee will be at least 3 feet above the tailing surface. The tops and downstream slopes of the levee and buttress will then be covered with 1 foot of subsoil and 1 foot of topsoil and revegetated.

The saddle dam and the reclaim water cell will generally conform to their current, as-built configuration. The saddle dam top will be rounded and the material dozed into the reclaim cell to cover the tailing solids within the cell. One foot of subsoil and 1 foot of topsoil will then be placed over the entire upstream face of the saddle dam and in the reclaim water cell.

3.5 Cover Design

Covering the top of the tailing will isolate the tailing solids from the surface environment and reduce infiltration into the tailing. This would prevent the direct contact with humans or animals and will eliminate transport of soluble tailing constituents into surface runoff. The topsoil member of the cover would also provide a suitable growth medium for a cover of perennial plants. The vegetation will protect the topsoil from erosion, support the post-mining land use, and provide evapotranspiration to reduce the net infiltration of precipitation into the underlying members of the cover and the tailing.

During preparation of the final closure plan for the Mercur tailing facility, Barrick has objectively evaluated a number of potential cover designs. Five environmental engineering firms independently evaluated the performance of more than 40 cover designs (Knight Piesold, 1995; JBR, 1995b; TriTechnics, 1996; PRE, 1996; and Steffen, Robertson and Kirsten, 1997) Various designs were evaluated and compared for a number of characteristics including but not limited to:

1) Reducing infiltration into the tailing,

2) Isolating the tailing from the surface environment,

3) Sustaining a perennial vegetative cover,

4) Preventing upward migration of tailing constituents,

5) Preventing erosion of the tailing,

6) Feasibility of construction.

Each of these engineering firms independently evaluated the situation and came to the following general conclusions:

1) An earth cover could be constructed over the dried tailing solids.

2) A cover including topsoil and subsoil layers would support a permanent vegetation cover.

3) Most of the annual precipitation (91-99 %) would flow off of the cover as runoff.

4) A small amount of annual precipitation (1-9 %) would infiltrate into the revegetated top member of the cover.

5) Most of the annual infiltration (87-99%) would be removed annually by evapotranspiration.

6) A small amount of the annual precipitation (1-8 %) would penetrate the revegetated topsoil cover and infiltrate into the underlying tailings solids.

7) Construction of an impermeable clay layer as a design component of the cover was rejected due to construction difficulties and poor cost-benefit assessments.

It was found that clay covers do not demonstrate substantially superior performance in inhibiting net infiltration over earth covers that do not include clay members (JBR, 1995b). In addition, a compacted clay layer would be extremely difficult to construct over unconsolidated tailing, and would loose its performance advantages when penetrated by plant roots (Knight Piesold, 1995).

Increasing the cover thickness over 3 feet did not significantly decrease infiltration through the cover (TriTechnics, 1996). A good perennial vegetation cover was found to be important for eliminating most of the annual precipitation infiltration through evapotranspiration. Good vegetation and a cover thickness of about 3 feet appeared to be the optimal cover configuration (JBR, 1995b).

Permeable gravel drain members in the cover did not appear to significantly reduce infiltration due to the relatively flat slope of the cover which did not remove the infiltration collected in the drainage members (Tritechnics, 1996; JBR, 1995b).

The proposed final cover for the Mercur tailing facility, from top to bottom is:

1) 1-foot of topsoil obtained from existing stockpiles,

2) 1-foot of subsoil (alluvium or alluvium/rock fill),

3) 1-foot of broken rock fill, either limestone or rhyolite to act as a capillary break between the underlying tailing and the rest of the cover.

3.6 Vegetation

The upper portion of the cover will consist of a nominal 12 inches of salvaged topsoil material which would support the final vegetative cover. The permanent seed mix suggested in Table 3.4-1 will then be planted by one of three methods to be determined: broadcast and harrow, drill seeding, or hydroseeding. Following seeding, mulch and fertilizer will be applied at appropriate rates

Table 3.6-1 Final Seeding Mixture

Common Name	Scientific Name	Drill Seeding Rate*
Bottlebrush squirreltail	Stanion hystrix	1.0
Western wheatgrass	Elymus smithii	2.0
thickspike wheatgrass	Agropyron dasystachyum	2.0
bluebunch wheatgrass	Agropyron spicatum	2.0
Russian Wildrye	Elymus junceus	1.0
Cicer milkvetch	Astragalus cicer	1.0
Alfalfa	Medicago sativa	1.0
Palmer penstomen	Penstemon palmeri	1.0
Lewis blue flax	Linum lewisii	1.25
fourwing saltbrush	Atriplex canescens	2.0
rubber rabbitbrush	Chrysothamnus nauseosus	0.50
black sagebrush	Artemisia nova	0.25
Total lbs/acre		15.0

* Units are pounds of pure live seed. Double the seeding rate if broadcast seeded

3.7 Monitoring

Following completion of the closure plan for the tailing, monitoring would continue in compliance with the DOGM, DWQ, and DWR permit requirements.

3.7.1 Division of Oil, Gas & Mining

Monitoring for compliance with DOGM requirements will primarily be focused on tracking the success of the stabilization of the land surface for the post-mining land use. The monitoring program will extend for 3 years following completion of revegetation work with final measurement of plant cover success for bond release at the conclusion of the third year's growing season. Annual data would be collected based on field data and observations (JBR, 1997).

Field observations would be conducted quarterly for three years checking for evidence of trespass, erosion and vegetation distress. Field notes and photographic documentation of these visits will be made. Photo stations would be established in the fall following completion of seeding and the initial photos would be taken. Subsequent photos would be taken in the fall of each year for three years. Precipitation data would continue be collected at the site to track the amount of annual moisture received at the site during the monitoring period.

Final photos and random, 100 line intercept transects would be read in the fall of the third year. The sample variation for the line intercept transects would be less than 10%. A final report would contain data from the field checks, precipitation data, photos, and transect data on the vegetation cover and composition.

3.7.2 Division of Water Quality

Monitoring of the ground water quality in the area of the tailing facility would continue as required by the Mercur Ground Water Discharge Permit No. UGW450002. The monitoring procedures and analytes currently included in the Mercur ground water monitoring QA/QC plan would be followed during the term of the existing permit, until its expiration in 2002. At that time, Barrick would review the monitoring data collected to that date with the DWQ to mutually determine the monitoring program that would continue past that date.

Observations related to the structural integrity of the cover, any evidence of excessive erosion, and the relative success of the vegetation cover will also be available from inspections conducted for DOGM. Records of these inspections will be made available to both DOGM and the DWQ.

3.7.3 Division of Water Rights (Dam Safety Section)

Current operational monitoring practices of the embankment piezometers will continue through 1999. After 1999, only stand pipes will be monitored quarterly for phreatic surface. These will also be monitored after any major flood or local earthquake of magnitude 4 or greater. Stand pipe readings will be terminated once stand pipes 23, 27, 41, 44, and 46 achieve a 75% pressure reduction from the pressures recorded at mill shutdown in 1998. The quarterly inspections conducted for DOGM and the DWQ will also include observations of the condition of the embankments, drainage diversions, and spillway. This information will be made available to the DWR .

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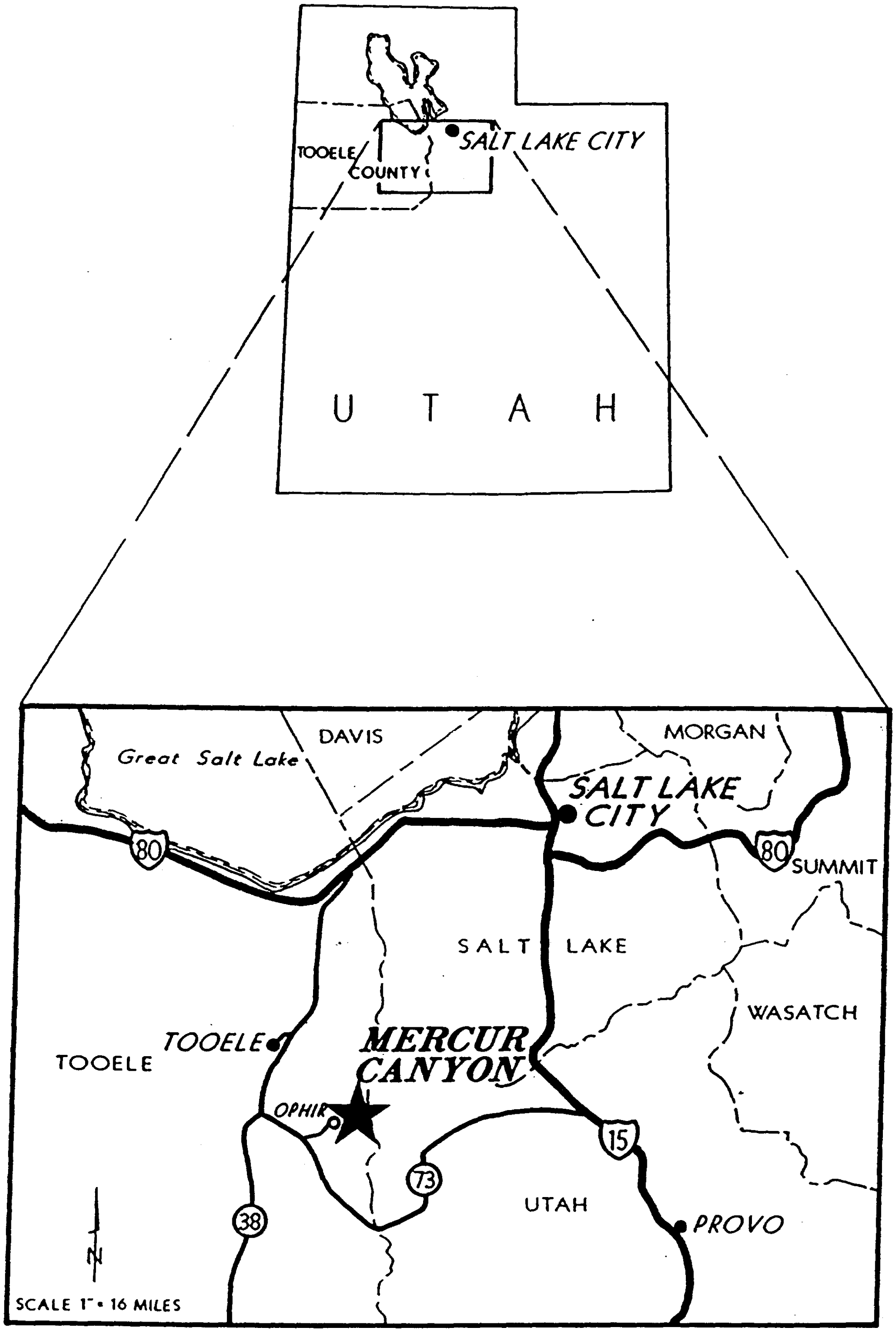
FIGURES



BARRICK RESOURCES (USA), INC.

MERCUR MINE

FIGURE 1
LOCATION MAP

jbr environmental consultants, inc.
Salt Lake City, Utah Cedar City, Utah Reno, Nevada Elko, Nevada

DESIGN BY	DRAWN BY	CH'D BY	SCALE	DATE DRAWN
BWB	CLP		NONE	12/9/97

REVISION

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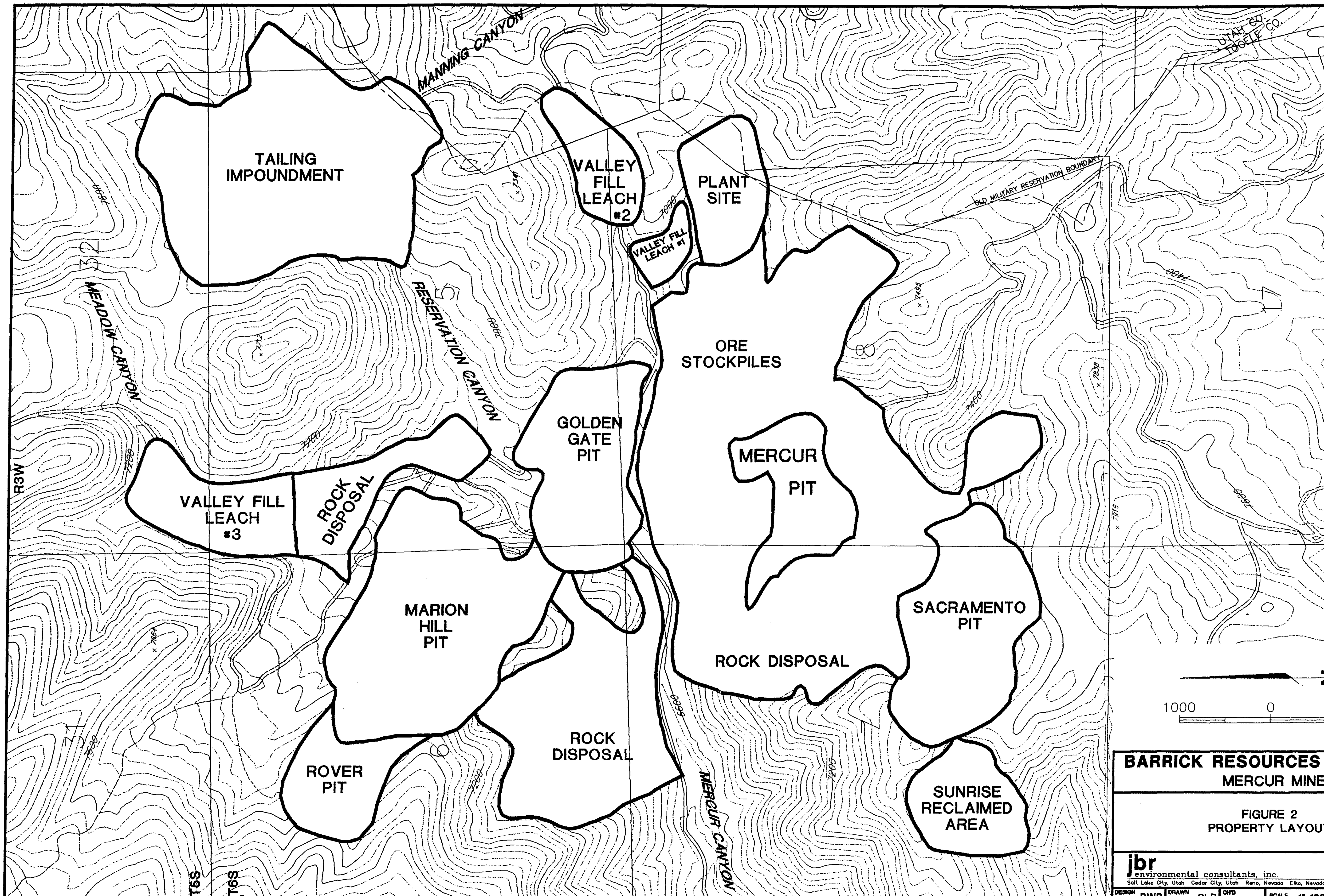

BARRICK RESOURCES (USA), INC.
MERCUR MINE

FIGURE 2
PROPERTY LAYOUT

jbr environmental consultants, inc.
Salt Lake City, Utah Cedar City, Utah Reno, Nevada Elko, Nevada

DESIGN BY	BWB	DRAWN BY	CLP	CHK'D BY		SCALE	1"=1000'

DATE DRAWN	11/23/91
REVISION	10/31/97

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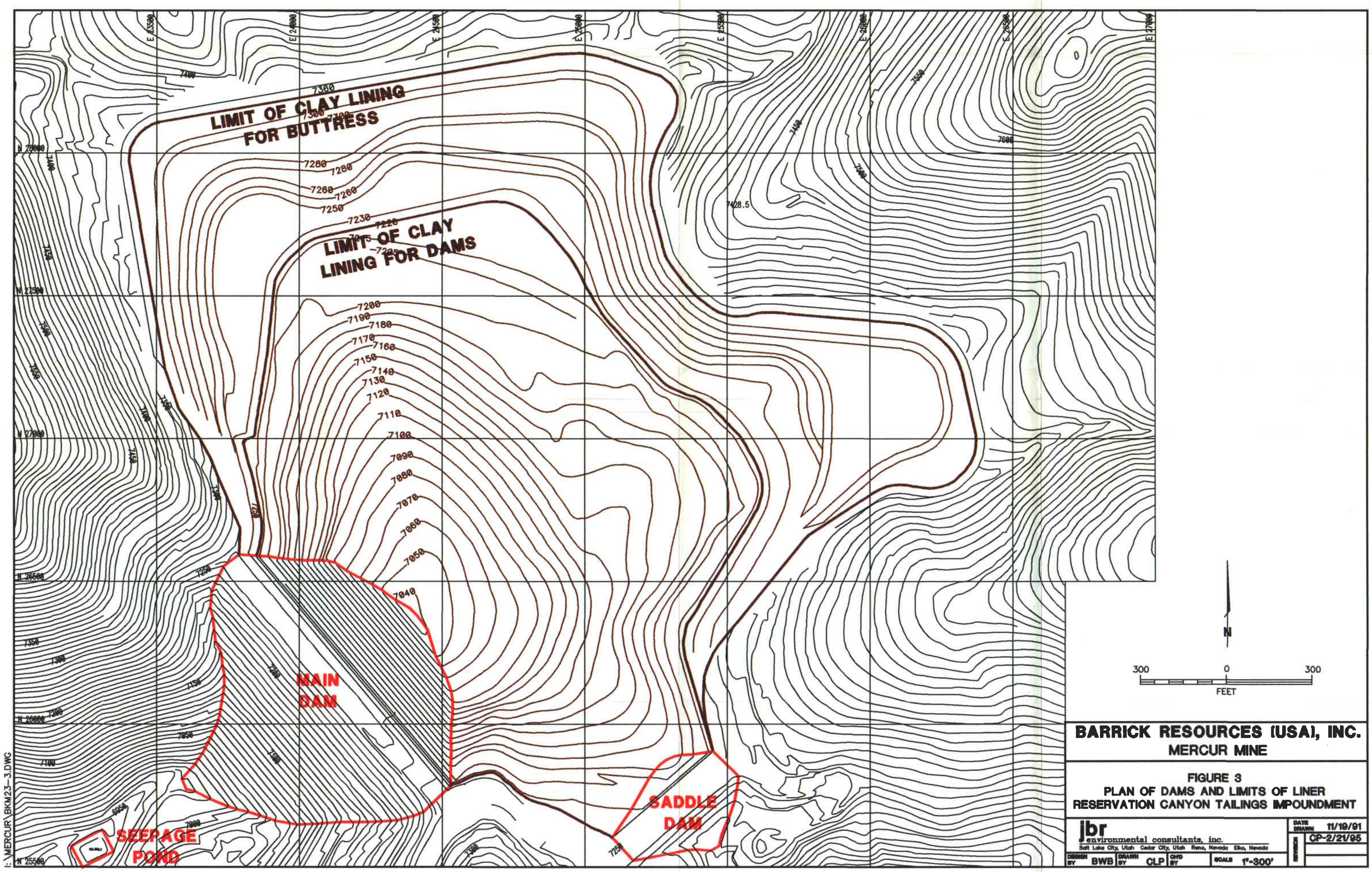

BARRICK RESOURCES (USA), INC.
MERCUR MINE

FIGURE 3
PLAN OF DAMS AND LIMITS OF LINER
RESERVATION CANYON TAILINGS IMPOUNDMENT

jbr environmental consultants, inc.
Salt Lake City, Utah Cedar City, Utah Reno, Nevada Elko, Nevada

DESIGN BY	DRAWN BY	CHK'D BY	SCALE	DATE DRAWN	REVISION
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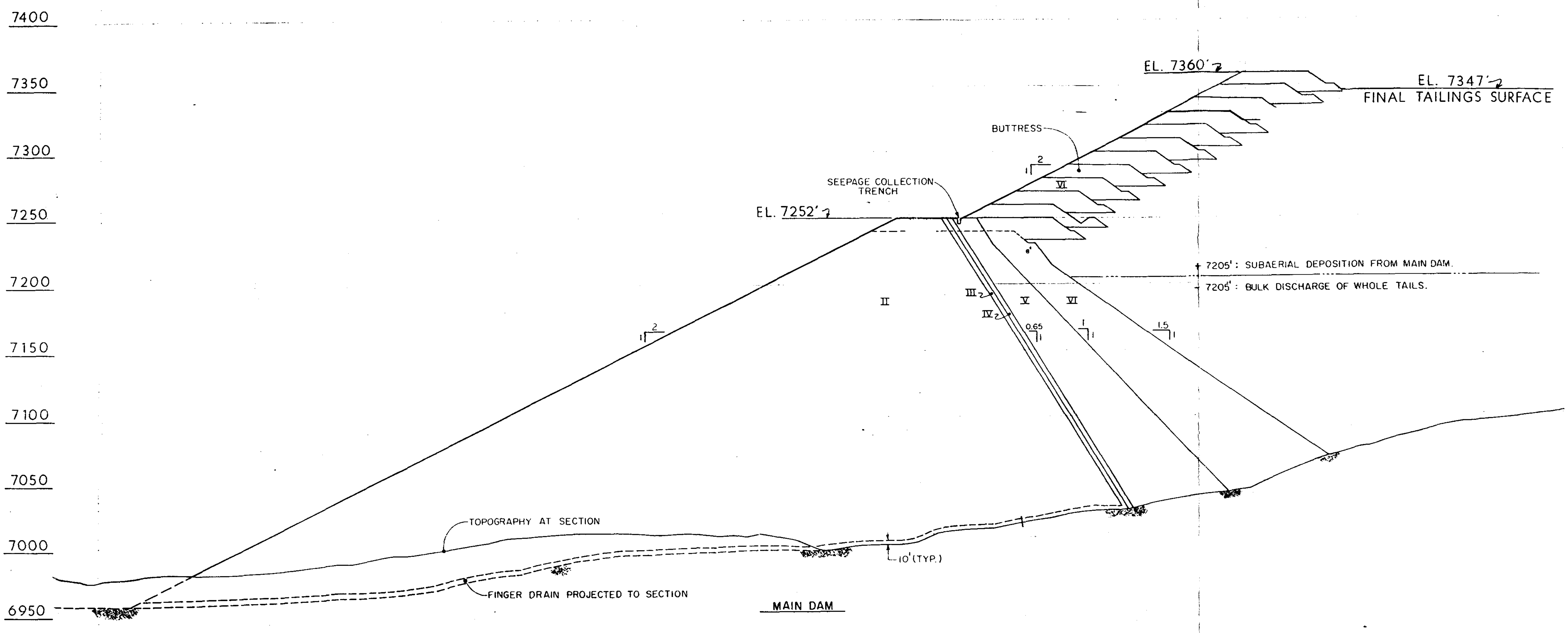

BARRICK RESOURCES [USA], INC.
MERCUR MINE

FIGURE 4
CROSS SECTION THROUGH MAIN DAM AND BUTTRESS SHOWING FINAL ELEVATIONS

jbr environmental consultants, inc.
Salt Lake City, Utah Cedar City, Utah Reno, Nevada Elko, Nevada

DESIGN BY	DRAWN BY	CHK'D BY	SCALE	DATE DRAWN
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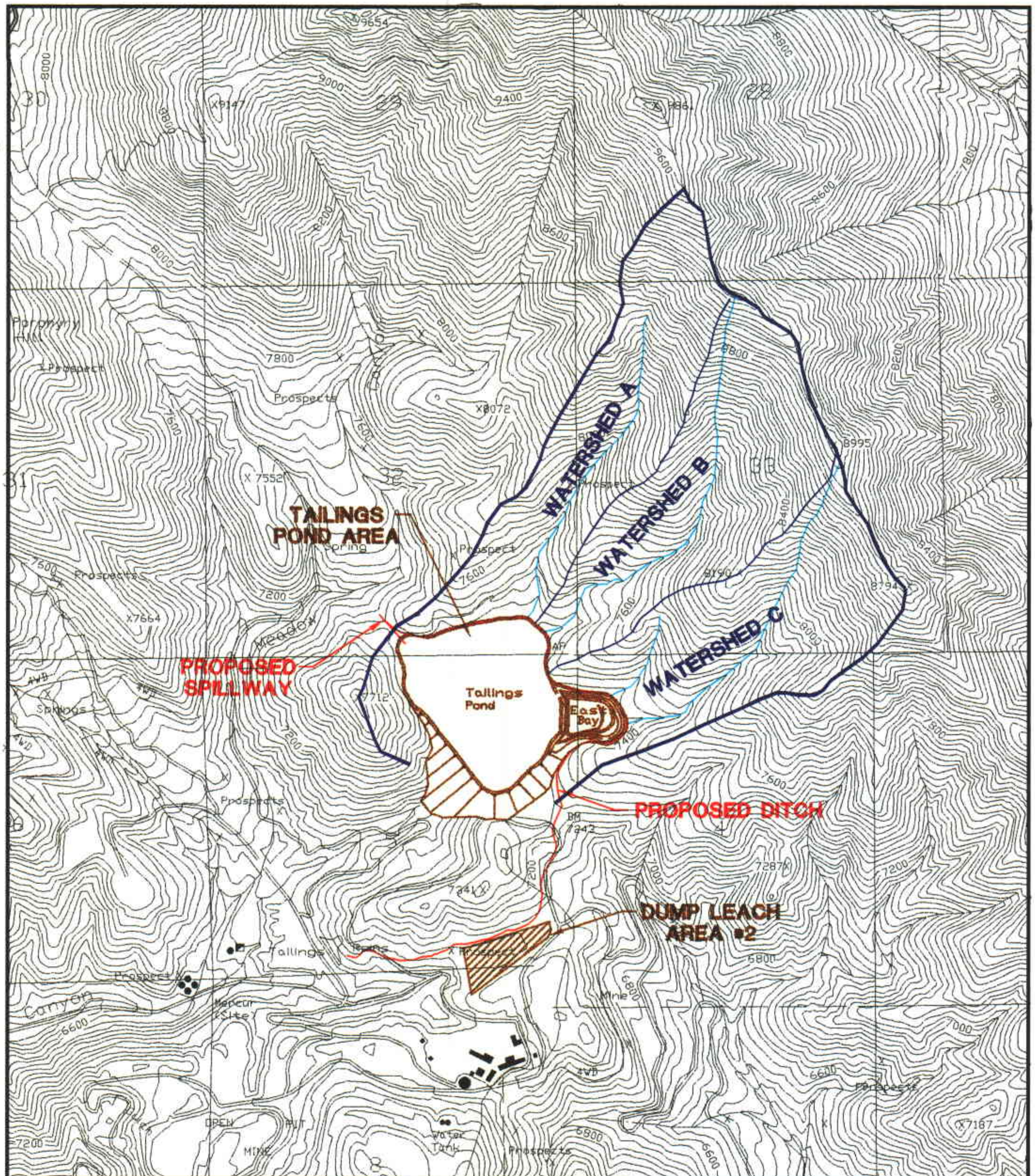

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BARRICK RESOURCES (USA), INC.

MERCUR MINE

FIGURE 5
WATERSHED AREA MAP

jbr environmental consultants, inc.
Salt Lake City, Utah Cedar City, Utah Reno, Nevada Elko, Nevada

DESIGN BY	MA	DRAWN BY	CLP	CHK'D BY		SCALE	1"=2000'	DATE DRAWN	2/14/96

REVISIONS

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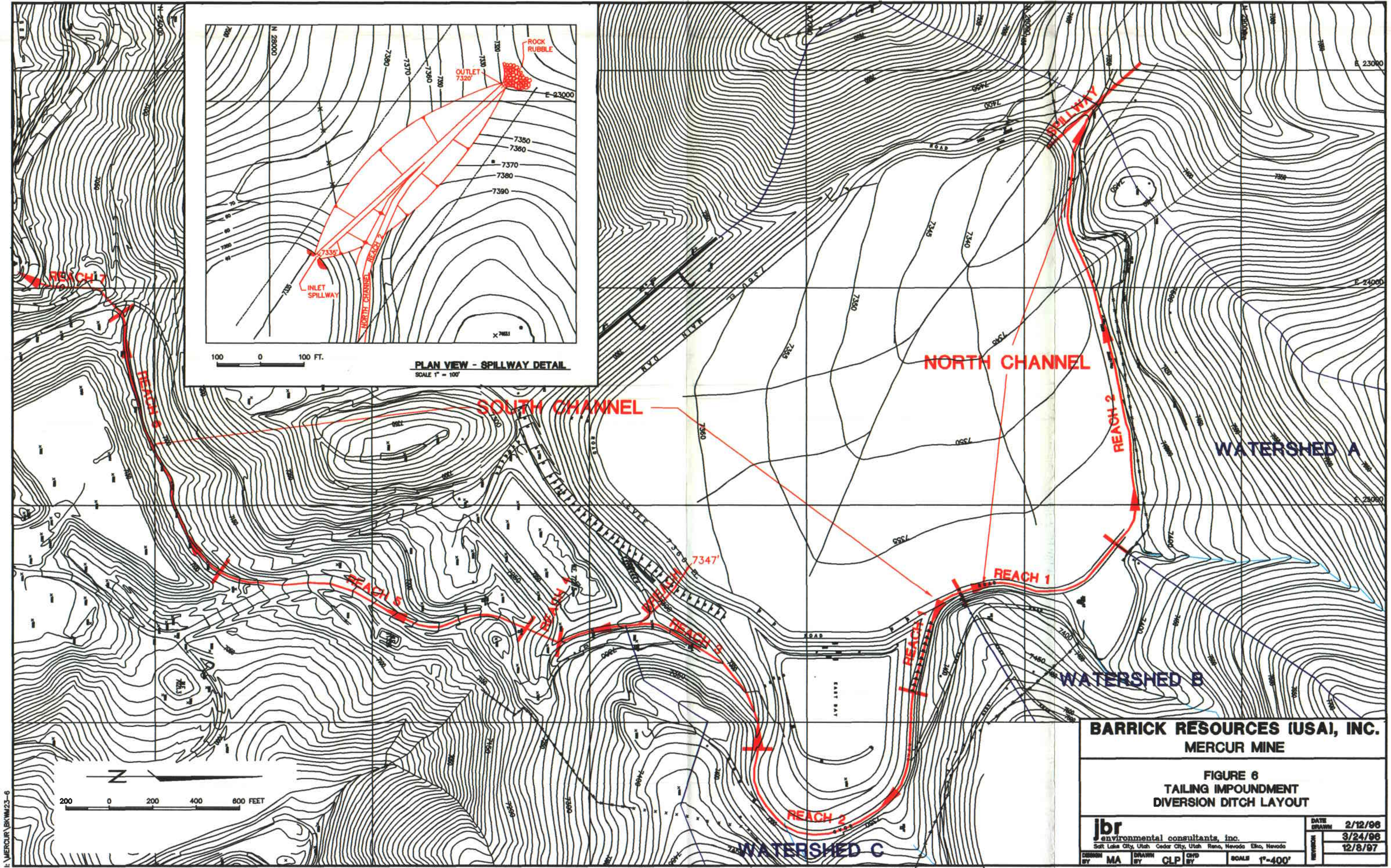

BARRICK RESOURCES (USA), INC.
MERCUR MINE

FIGURE 6
TAILING IMPOUNDMENT
DIVERSION DITCH LAYOUT

jbr environmental consultants, inc.
Salt Lake City, Utah Cedar City, Utah Reno, Nevada Elko, Nevada

DESIGN BY	MA	DRAWN BY	CLP	CHKD BY		SCALE	1"=400'

DATE DRAWN	2/12/96
REVISION	3/24/96
	12/8/97

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